

FUNDAMENTAL RHEOLOGICAL PROPERTIES OF SPONTANEOUSLY-FERMENTED ANCIENT WHEAT SOURDOUGHS

Miroslav Hadnađev^{1*}, Jelena Tomić¹, Dubravka Škrobot¹,
Tamara Dapčević-Hadnađev¹

¹University of Novi Sad, Institute of Food Technology, Bul. cara Lazara 1,
21000 Novi Sad, Serbia

*email: miroslav.hadnadjev@fins.uns.ac.rs

Introduction

Increased conscience of consumers to healthy and functional foods brought ancient wheat grains and sourdough fermentation back to the spotlight of scientific society. In order to evaluate the potential of ancient wheat grains to produce spontaneously fermented sourdough, wholegrain emmer, spelt and khorasan flours were subjected to spontaneous fermentation through five backslopping, while following pH evolution and level of leavening.

The fundamental rheological behaviour of spontaneously-fermented emmer, spelt and khorasan sourdoughs was studied from final backslopping over a 12-hr fermentation period and compared to flour gluten quality.

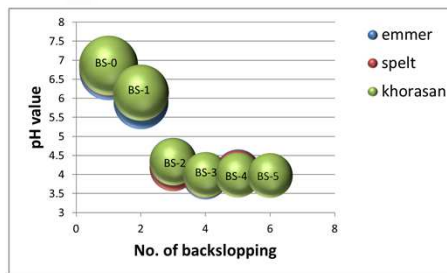


Figure 1. pH evolution during spontaneous-fermentation of emmer, spelt and khorasan sourdoughs

Materials and methods

Spontaneously-fermented sourdough was prepared through backslopping (every 24 h, 5 days) under laboratory conditions (temperature of 25 °C, dough yield of 200).

The following methods were employed: wet gluten and gluten index determination in flour (ICC No. 155), direct pH measurement with pH probe, level of leavening (expressed as the increase in height between two backsloppings) and stress sweep test with the aid of HAAKE Mars rheometer (PP 355 measuring geometry).

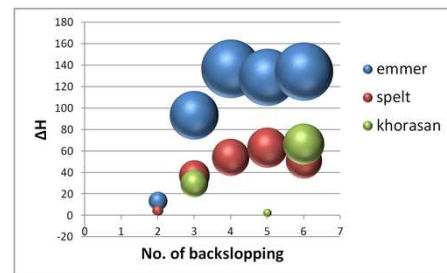


Figure 2. Level of leavening during spontaneous-fermentation of emmer, spelt and khorasan sourdoughs

Results and discussion

Emmer, spelt and khorasan sourdoughs exhibited similar pH evolution, but they significantly differed in level of leavening (expressed as the increase in height between two backsloppings), gluten index values and dynamic viscoelastic properties. The pH of all sourdoughs decreased from 6.5 to 4.0 after four backslopping steps. Emmer flour which exhibited the lowest gluten quality (gluten index value) was characterized with the fastest and the highest level of leavening during sourdough propagation. Results of the dynamic oscillatory rheological analysis showed that there was a decrease in dough elasticity with fermentation time for all three sourdoughs, which could be ascribed to protein degradation and conformational changes due to proteolytic activity and acidic environment.

It can be concluded that sourdough structure degrading processes was affected with the differences in gluten quality of ancient wheat.

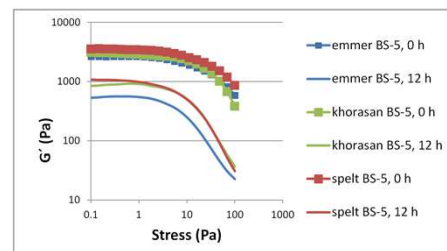


Figure 3. Changes in rheological properties (storage modulus) during spontaneous-fermentation of emmer, spelt and khorasan sourdoughs



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